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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/605,108

09/09/2003

Dureseti Chidambarao

FIS920030183US1

2107

7590

12/28/2005

Andrew M. Calderon
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EXAMINER

PHAM, LONG

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 12/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Period for Reply

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

1) ☒ Responsive to communication(s) filed on 21 November 2005.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

4) ☒ Claim(s) 16-18 and 21-29 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 16-18 and 21-29 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some * c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. ____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

1) ☒ Notice of References Cited (PTO-892)
 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____

4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date _____
 5) ☐ Notice of Informal Patent Application (PTO-152)
 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

In light of newly found prior art reference, the indication of allowability of claims 16-18 and 21-29 have been withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 16, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art of this application (AAPA) in combination with Yoo (US patent 6,200,836).

With respect to claims 16, 17, 18, 21, and 27, AAPA teaches a method for manufacturing a semiconductor device, comprising steps of (see the Background of Invention of this application):

Forming source and drain regions in an upper surface of a Sage-based substrate, the source and drain region containing an n-type impurity.

AAPA fails to teach forming source and drain extension regions in the upper surface of the substrate and ion implanting interstitial element or oxygen into the source and drain extension regions.

Yoo teaches forming source and drain extension regions 16,18 in the upper surface of a substrate and ion implanting interstitial element or oxygen into the source and drain extension regions to prevent increase in threshold voltage,

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eliminate leakage current, and achieve high performance. See fig. 2 and associated text and col. 3, lines 1-10.

It would have been obvious to one of ordinary skill in the art of making semiconductor devices to incorporate the above teaching of Yoo into the process of AAPA to obtain the above benefits.

Further with respect to claim 16, since AAPA in combination with Yoo teach implanting oxygen into the source and drain extension regions as claimed, the vacancy concentration in the source and drain regions would inherently reduce.

With respect to claim 28, Yoo further teaches implanting oxygen into the source and drain regions. See claim 1 of Yoo.

With respect to claim 29, since Yoo teaches implanting oxygen into the source and drain regions as claimed, the vacancy concentration in the source and drain regions would inherently reduce.

With respect to claim 25, Yoo further teaches annealing treatment. See col. 4, lines 30-40.

With respect to claim 26, AAPA in combination with Yoo teach performing heat treatment but fail to teach the ranges for the annealing temperature and annealing duration.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal value or ranges for the annealing temperature and duration through routine experimentation and optimization to obtain optimal or desired device performance because in the absence of unexpected result it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claim 22, AAPA in combination with Yoo teach implanting oxygen into the source and drain extension regions but fail to teach the ranges for implantation concentration and energy.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal value or ranges for the implantation concentration and energy through routine experimentation and optimization to obtain optimal or desired device performance because in the absence of unexpected result it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claims 23 and 34, AAPA in combination with Yoo appear to fail to teach forming a si cap layer.

However, the formation of a silicon cap on semiconductor device is well-known.

Further with respect to claims 23 and 34, AAPA in combination with Yoo further fail to teach the ranges for the concentration peak for oxygen and N impurity of the source and drain extension regions and the concentration peaks of oxygen and n impurity of source and drain extension regions are at the substantially same height from upper surface of a silicon cap layer.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal value or ranges for the concentration peaks for oxygen and n impurity of the source and drain extension regions through routine experimentation and optimization to obtain optimal or desired device performance because in the absence of unexpected result it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long Pham whose telephone number is 571-272-1714. The examiner can normally be reached on Mon-Frid, 10am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Long, Pham
Primary Examiner
Art Unit 2814

LP